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ABSTRACT

As part of a curriculum development project for gifted students, seventh and tenth grades (N=323) were tested with the Structure of Intellect Learning Abilities Test (SOI-LA) to compare students' scores with norms already collected, investigate differences between the sexes, identify specific types of tasks to promote achievement, and to determine whether a relationship existed between student SOI-LA scores and standardized test scores. Arithmetic means, standard deviations, and number of students participating were calculated for all SOI-LA subtests. Results were presented for basic reading, advanced reading, arithmetic computational, and creative thought skills as compared to norms for the SOI. Among findings were that seventh grade males and females scored significantly below most SOI norms in basic reading skills, advanced reading skills, and arithmetic computational skills. Tenth grade males and females showed significant differences in 5 of 11 cells in arithmetic computation, suggesting the need for differentiated curriculum; and moderate to good positive correlations were found between SOI scores and standardized test scores. (CL)

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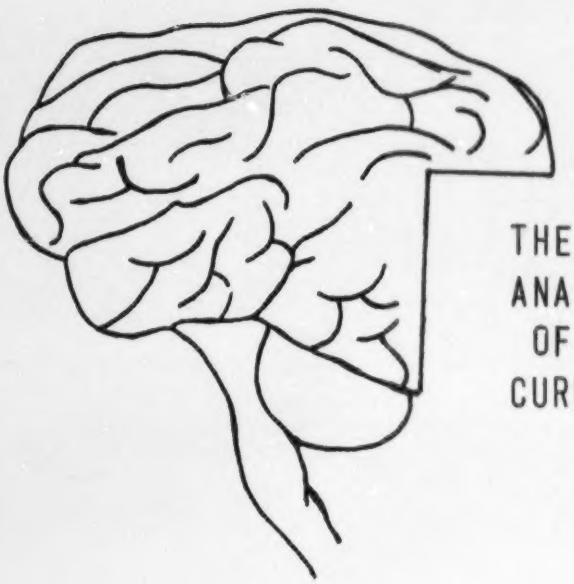

THE ANATOMY OF A CURRICULUM

A Report Prepared
for
United Independent School District
by
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May 1981

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Hal Kanter
Laredo, Texas
May 1981

The Evolution of the Project

A brief description of the historical events which led to the study is included as it can offer the reader insight into factors associated with the research project.

In the summer of 1979, the Superintendent of United Independent School District requested consultation assistance from Laredo State University to initiate a program for the gifted/talented (G/T) students in the school district. The school district board had committed funds for the proposed program for a) salaries for special G/T teachers, b) materials for the special G/T classes, and c) funds for G/T in-service education for teachers and administrators in the district. The last item, in-service education was provided by Laredo State University in the form of two 3 semester hour courses during the Fall 1979 semester (six contact hours per week), and one 3 semester hour course during the Spring 1980 semester (three contact hours per week) conducted by this writer. The Apollo program for Gifted and Talented at United Independent School District started concurrently with the coursework in the Fall of 1979. Enrollment that semester in the G/T courses consisted of nine classroom teachers, six school principals, three curriculum supervisors, and the superintendent of schools.

Topics during the ninety hours of instruction, ranged from surveys of current literature on programs for the gifted to the writing of a G/T Guide with policies on gifted student identification procedures. The latter part of the Fall 1979 semester saw the completion of the policy manual on the APOLLO Program. The next logical step was to engage in curriculum development for the remainder of that semester and continue with curriculum development as the major topic in the Spring 1980 semester.

The class was presented information on a variety of models with which content in the curriculum could be classified. An

informal survey of literature on programs for the gifted concluded that Bloom's Taxonomy of Educational Objectives (1) was overwhelmingly recommended most often as the model for curriculum development. Bloom's six part hierarchical system in the cognitive domain would allow the participants to classify tasks, assignments, and questions according to complexity of the thought process (knowledge, comprehension, application, analysis, synthesis, and evaluation) involved. Many of the participants were familiar with the Taxonomy, having been exposed to it at undergraduate and graduate levels in different colleges and universities. The consensus of the group was that while the Taxonomy could be very helpful in curriculum development, it did not offer a comprehensive, systematic, holistic package to make curricular decisions and implement them in the classroom. In short, the group felt that it was a better evaluation model than curriculum development model.

Gagné's Conditions of Learning (2) was the next paradigm explored by the class. Similar to Bloom's Taxonomy, Gagné offered a hierarchical classification system of mental modes of thought processes (signal learning, stimulus-response learning, chaining, verbal association, discrimination learning, concept learning, rule learning, and problem solving). After much discussion, the group rejected the model for similar reasons that they declined the Taxonomy.

Piaget's theory of Intellectual Development (3,4) was the next model to be analyzed by the group for its usefulness in developing a curriculum for the G/T program. Unlike the first two systems examined, Piagetian tasks offered a diagnostic-prescriptive approach designed to assess the learner's level of thinking ability and then systematically challenge him with more symbolic and abstract problems to solve. Difficulty in implementation in the classroom by one teacher with a large group of students and incompatibility with the content in mandated state-adopted textbooks were the most often cited reasons for the participants asking, "What else is available?"

Mary Meeker's interpretation and application of Guilford's Structure of Intellect (5,6) was the next model to be analyzed for consideration. A three dimensional model of learning, the Structure of Intellect (SOI) offered a classification system for curriculum development which included mental operations (modes of thinking similar to Bloom and Gagné, but not necessarily in hierarchical order), integrated with classes of content (figural, symbolic, semantic, behavioral), associated with products (a hierarchy of types of tasks which teachers expect from learners). After much examination, many questions, and studied deliberation the group verdict was unanimously decided upon, "Let's go first class--with SOI."

The decision to use the SOI system for curriculum development had taken a great deal of class time and effort; however, it was vital that the group members possessed "ownership" of the system to be utilized rather than have it forced upon them from someone outside the Apollo Program. That process of "ownership" and the decision to use the SOI system would have significant bearing on the research study to come.

The remainder of the Fall 1979 semester was spent in introducing the Structure of Intellect concepts. The next semester, Spring 1980 was targeted for actual workshop sessions in developing curriculum for the Apollo Program with the SOI model. Between the Fall 1979 semester and registration for the Spring 1980 semester nine of the nineteen class members who were classroom teachers started to introduce SOI materials in their Apollo classes. Teachers who were not part of the Apollo Program started borrowing some of the materials to use in their own classrooms. They also indicated that they wanted to learn more about the SOI system. At Spring 1980 registration, in addition to the nine original Apollo teachers, seventeen additional non-Apollo Program teachers joined the class.

Class participants formed teams. Two major approaches were used: (1) some teams analyzed materials they used in their

classes, classifying them by the SOI system, and (2) other teams developed SOI tasks to supplement the regular curriculum. During large group discussions, questions emerged concerning the use of the SOI Learning Abilities Test as a diagnostic-prescriptive instrument, the effect SOI training would have on the long term achievement level of students, the relevance of SOI materials to the regular curriculum, and the collection of baseline data for comparison of future students. A research study was being conceived.

This writer, with the aid of school district personnel, drew up a research design to begin to answer some of the questions posed. A proposal was submitted to Laredo State University which included a commitment from the school district for aid in funding. In April 1980 the proposal was approved and the research study was born; a description of the study and the results are described in the remainder of this report.

The Elements of The Study

Purpose

The purpose of the study was to (1) analyze United Independent School District (UISD) student scores in reading skills, arithmetic skills, and creative thought utilizing the SOI classification system, (2) compare UISD student norms to norms already collected at the SOI Institute, (3) determine whether there were ability differences between the sexes at UISD, (4) identify specific types of tasks to enhance achievement levels in reading, arithmetic, and creative thought for students at UISD, (5) determine whether a relationship existed for students at UISD between SOI Learning Abilities scores and standardized test scores, and (6) establish a set of baseline data for students at UISD in the form of norms for the SOI Learning Abilities Test.

Subjects

The scope of the research study was restricted due to limited funding and personnel. A group of administrators and teachers at UISD decided that it would serve the district best to test all 7th graders and 10th graders during the Spring of 1980 rather than to attempt to take small samples of many grade levels. In May 1980, 323 seventh graders (151 males and 172 females) were tested with the SOI-LA test at United Independent School District.

Demographics

The student population at United Independent School District was approximately 70% Hispanic surnamed and 30% non-Hispanic surnamed at both the 7th and 10th grade levels at the time of the testing. The school district lies just outside the city limits of Laredo, Texas and draws its student population from several subdivisions in Webb County surrounding the city of Laredo, in addition to some ranches and rural areas. The income range of homes in the United Independent School District varies from low socio-economic to middle-income to highly

affluent. The median income of families within the district would be significantly higher than the city of Laredo.

Instrument

The SOI-LA Test, Form A (7) was administered to the 7th and 10th graders at United Independent School District during May 1980. The test consisted of twenty-four subtests which attempted to assess specific abilities necessary for basic reading skills, arithmetic computational skills, advanced reading skills, and creative thought. When reading skills and computational skills were combined, the composite score yielded abilities necessary to solve mathematical word problems.

Procedures

In the Spring of 1980, selected teachers from the 7th and 10th grades at United Independent School District were given training on the administration of the SOI-LA Test. In May 1980, the tests were administered to the students and sent to the SOI Institute where they were machine scored and computer printouts were prepared which listed an analysis of each student on the twenty-four subtests in seven different matrices. Data were collected, compiled, and analyzed. In addition, data for a standardized test used by the district, the Comprehensive Tests of Basic Skills (8) were also collected for a comparative analysis.

Statistical Analysis

Arithmetic means, standard deviations, and number of students who participated were calculated for all SOI-LA subtests and reported in Tables 1 through 24. Also included in those tables were differences in mean scores of the stated populations and a level of significance to ascertain whether the difference in score was meaningful, calculated by a "t-test for means." The level of significance was recorded at the .01, .02, or .05 levels of confidence.

Tables 25 through 28 indicate results of the SOI-LA subtests, by class roster in reading and arithmetic, for 7th and 10th grades. Table 29 lists the correlation coefficient, calculated by linear regression, of SOI subtests and a standardized test used by the school district. Appendices I and II lists base-line data for the SOI-LA subtests in the form of quartile raw scores, which the school district can use for comparative purposes in the future.

An Overview of S.O.I.

Prior to reporting the findings of the study, it would be useful to present a brief overview of the Structure of Intellect (SOI) model for the reader who may be unfamiliar with the system.

The SOI model is a classification system whereby any question, task, assignment, or problem can be placed in a category which describes the mode of thinking required, the content area under consideration and the complexity of form and substance of the final product. The theoretical framework was established by J.P. Guilford (9,10); the transformational work from theory into practice was done by Mary Meeker (5,6).

Operations

The SOI system classifies modes of thinking or mental operations into five categories: (1) Cognition (comprehension of information), (2) Memory (recall of information), (3) Convergent Production (application in problem solving), (4) Divergent Production (creative or original thinking), and (5) Evaluation (analyzing or synthesizing information).

Content

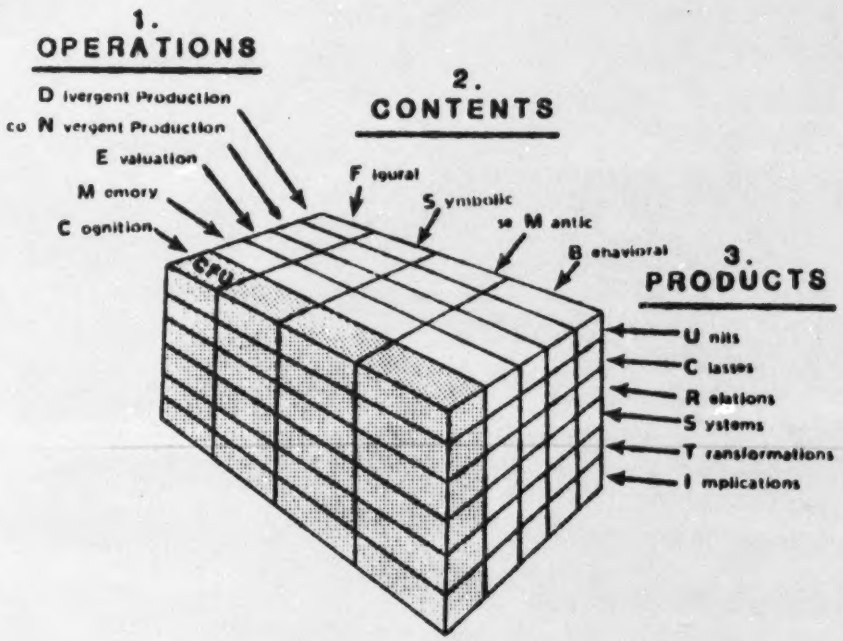
The SOI system classifies content or subject areas into four categories: (1) Figural (shapes such as triangles, circles or drawings), (2) Symbolic (figures which form a code system such as the alphabet or number system), (3) Semantic (words and word combinations which express meaning), and (4) Behavioral (non-verbal and/or affective areas).

Products

The SOI system classifies products or the form and substance of the task required into six categories: (1) Units (single items), (2) Classes (sets of items), (3) Relations (connecting items), (4) Systems (organized items), (5) Transformations (changed items), and (6) Implications (inferred items).

Figure 1

THE STRUCTURE OF INTELLECT MODEL



A detailed inspection of Figure 1 will allow the reader to study the synthesis of operations, contents, and products into the three dimensional classification system called Structure of Intellect. A simple calculation of five operations times four content areas times six products yields a total of one hundred twenty blocks or cells within the large cube. If each cell constitutes a form of intelligence (which is a basic assumption of the SOI system) then there are 120 different types of intelligence and each can be identified and named. The labeling of each cell is simply done by using a trigraph (three letters) corresponding to the operation first, the content second, and the product last--and always in that sequence. It should be noted that the initial letter of each term is used as the symbol to form the trigraph with two exceptions; "N" is the symbol for convergent production and "M" is the symbol for semantics. As the diagram illustrates, CFU names the cell, Cognition of Figural Units. NMS would be Convergent Production of Semantic Systems and MMC would identify the cell Memory of Semantic Classes. The shaded area

in Figure 1 represents all of the cells which will start with "C" for Cognition.

A second assumption of the SOI system is that approximately twenty-four of the possible one hundred twenty cells in the cube are directly related to school success via achievement in primarily reading and arithmetic skills(6,7). Thus the SOI-LA Test used in this research study reports on approximately two dozen cells. Additional information about these cells with illustrations of classroom applications will be recorded in the next section of the report.

The Results of The Study

Basic Reading Skills

The Structure of Intellect system identifies six cells related to basic reading skills. The cell names and illustrations of classroom tasks are:

1. CFU - Cognition of Figural Units (recognition of shapes and visual closure)
2. CFC - Cognition of Figural Classes (classification of figures)
3. EFU - Evaluation of Figural Units (visual discrimination)
4. EFC - Evaluation of Figural Classes (classification of similarities and differences)
5. MSU - Memory of Symbolic Units (visual recall of letters and digits)
6. MSS - Memory of Symbolic Systems (visual recall for sequencing symbols)

Table 1 is a comparison of average scores of 7th grade UISD males with SOI intermediate grade norms.

In examining this table and other tables in this study, the reader should be aware that the UISD sample was in the ninth month of the respective grade (7.9 or 10.9) and therefore the students were closer to the next grade level they would be entering than at the beginning of the 7th or 10th grade.

In five of the six cells described above and reported in Table 1 the 7th grade male's scores were significantly below the SOI norms for intermediate grades. In MSU, Memory of Symbolic Units (visual recall of letters and digits) the 7th grade males scored significantly higher than SOI norms.

Table 2 is similar to Table 1 except that it depicts the average scores of 7th grade females compared to SOI norms.

The same phenomenon appears to be evident; five of six cells were below norm and one cell, Memory of Symbolic Units, was above norm.

TABLE 1

Comparison of Raw Score Means for Selected Subtests
of the
SOI-LA Basic Test

Grade: 7.9 D.O.T.: May 1980

Basic Reading Skills

SOI CELL	UISD Males MEAN	S.D.	N	SOI Norms[1] MEAN	S.D.	N	Diff. +/-	Level of[2] SIGNIF.
CFU	11.05	2.65	150	11.93	1.83	1557	-0.88	.01
CFC	5.79	1.67	150	7.47	1.33	1510	-1.68	.01
EFU	15.48	3.56	151	18.56	2.74	1548	-3.08	.01
EFC	8.85	1.85	151	11.21	1.72	1539	-2.36	.01
MSU	17.01	2.08	151	15.59	1.34	1554	+1.42	.01
MSS	11.76	5.37	127	14.25	3.18	1550	-2.49	.01

[1]Intermediate Grade Norms from the SOI Institute

[2]Determined by t-test for means

TABLE 2

Comparison of Raw Score Means for Selected Subtests
of the
SOI-LA Basic Test

Grade: 7.9 D.O.T.: May 1980

Basic Reading Skills

SOI CELL	UISD Females MEAN	S.D.	N	SOI Norms[2] MEAN	S.D.	N	Diff. +/-	Level of[2] SIGNIF.
CFU	11.49	1.69	170	11.93	1.83	1557	-0.44	.01
CFC	6.10	1.65	172	7.47	1.33	1510	-1.37	.01
EFU	16.10	3.32	172	18.56	2.74	1548	-2.46	.01
EFC	8.60	1.88	172	11.21	1.72	1539	-2.61	.01
MSU	17.12	1.68	172	15.59	1.34	1554	+1.53	.01
MSS	12.57	5.14	151	14.25	3.18	1550	-1.68	.01

[1]Intermediate Grade Norms from the SOI Institute

[2]Determined by t-test for means

TABLE 3

Comparison of Raw Score Means for Selected Subtests
of the
SOI-LA Basic Test

Grade: 7.9 D.O.T.: May 1980

Basic Reading Skills

CELL	UISD Males MEAN	S.D.	N	UISD Females MEAN	S.D.	N	DIFF.	Level of SIGNIF.[1]
CFU	11.05	2.65	150	11.49	1.69	170	+0.44(F)	nsd
CFC	5.79	1.67	150	6.1	1.65	172	+0.31(F)	nsd
EFU	15.48	3.56	151	16.1	3.32	172	+0.62(F)	nsd
EFC	8.85	1.85	151	8.6	1.88	172	+0.25(M)	nsd
MSU	17.01	2.08	151	17.12	1.68	172	+0.11(F)	nsd
MSS	11.76	5.37	127	12.57	5.14	151	+0.81(F)	nsd

[1]Determined by t-test for means

Table 3 compares 7th grade males and females on the same six basic reading cells. While subtle differences in the mean scores appear, statistically there are no significant differences between the two groups.

At this writing, the SOI Institute has not published secondary school norms; therefore, no tables have been constructed comparing 10th graders at UISD with any outside group. Table 4 represents a comparison between UISD 10th grade males and females on the same six basic reading cells. As with the 7th graders there are no significant differences between the sexes at the 10th grade.

The data contained in Table 5 may seem startling to the reader at first glance! In a comparison of 7th grade males with 10th grade males in the basic reading skills, there are no significant differences recorded on three of the six cells--no growth from 7th grade to 10th grade on EFC, MSU, and MSS! The reader can be somewhat assuaged since earlier research (6) indicates

TABLE 4

Comparison of Raw Score Means for Selected Subtests
of the
SOI-LA Basic Test

Grade: 10.9 D.O.T.: May 1980

Basic Reading Skills

CELL	UISD Males MEAN	S.D.	N	UISD Females MEAN	S.D.	N	DIFF.	Level of SIGNIF.[1]
CFU	11.89	1.75	100	11.59	2.22	120	+0.30(M)	nsd
CFC	6.64	1.35	96	6.63	1.27	114	+0.01(M)	nsd
EFU	17.96	3.10	99	17.40	3.30	120	+0.56(M)	nsd
EFC	9.14	2.12	92	9.33	2.46	114	+0.19(F)	nsd
MSU	17.27	1.45	96	17.50	1.01	119	+0.23(F)	nsd
MSS	13.03	4.98	90	13.10	5.33	116	+0.07(F)	nsd

[1]Determined by t-test for means

TABLE 5

Comparison of Raw Score Means for Selected Subtests
of the
SOI-LA Basic Test

Grades: 7.9 & 10.9 D.O.T.: May 1980

Basic Reading Skills

CELL	UISD 7th Grade Males MEAN	S.D.	N	UISD 10th Grade Males MEAN	S.D.	N	DIFF.	Level of SIGNIF.[1]
CFU	11.05	2.65	150	11.89	1.75	100	+0.84(10)	.01
CFC	5.79	1.67	150	6.64	1.35	96	+0.85(10)	.01
EFU	15.48	3.56	151	17.96	3.10	99	+2.48(10)	.01
EFC	8.85	1.85	151	9.14	2.12	92	+0.29(10)	nsd
MSU	17.01	2.08	151	17.27	1.45	96	+0.26(10)	nsd
MSS	11.76	5.37	127	13.03	4.98	90	+1.27(10)	nsd

[1]Determined by t-test for means

that expected scores on those cells show very little growth after elementary school. During this discussion, if the reader is not familiar with the translation of the cell trigraphs into classroom tasks, he should refer to the description of them at the beginning of this section.

Comparing basic reading skills of 7th grade females to 10th grade females in Table 6 yields still more interesting and valuable information. There was no significant difference in two of the six cells indicating virtually no growth from 7th grade to 10th grade in those areas. One of the no growth cells for girls was the same as for boys, MSS. The other cell of no growth for girls, CFU, was different from the opposite sex.

TABLE 6

Comparison of Raw Score Means for Selected Subtests
of the
SOI-LA Basic Test

Grades: 7.9 & 10.9 D.O.T.: May 1980

Basic Reading Skills

CELL	UISD 7th Grade Females MEAN	S.D.	N	UISD 10th Grade Females MEAN	S.D.	N	DIFF.	Level of SIGNIF.[1]
CFU	11.49	1.69	170	11.59	2.22	120	+0.10(10)	nsd
CFC	6.10	1.65	172	6.63	1.27	114	+0.53(10)	.01
EFU	16.10	3.32	172	17.40	3.30	120	+1.30(10)	.01
EFC	8.60	1.88	172	9.33	2.46	114	+0.73(10)	.01
MSU	17.12	1.68	172	17.50	1.01	119	+0.38(10)	.05
MSS	12.57	5.14	151	13.10	5.33	116	+0.53(10)	nsd

[1]Determined by t-test for means

TABLE 7

Comparison of Raw Score Means for Selected Subtests
of the
SOI-LA Basic Test

Grade: 7.9 D.O.T.: May 1980

Advanced Reading Skills

SOI CELL	UISD Males MEAN	S.D.	N	SOI Norms[1] MEAN	S.D.	N	Diff. +/-	Level of[2] SIGNIF.
CMU	15.83	4.54	151	19.58	3.05	1557	-3.75	.01
CMR	18.25	3.93	151	21.55	2.45	1553	-3.30	.01
CMS	13.88	4.20	151	18.03	2.74	1547	-4.15	.01
MFU	14.25	4.20	150	14.01	4.08	1540	+0.24	nsd
NST	116.46	32.20	151	139.66	24.93	1551	-23.20	.01

[1]Intermediate Grade Norms from the SOI Institute

[2]Determined by t-test for means

TABLE 8

Comparison of Raw Score Means for Selected Subtests
of the
SOI-LA Basic Skills Test

Grade: 7.9 D.O.T.: May 1980

Advanced Reading Skills

CELL	UISD Females MEAN	S.D.	N	SOI Norms[1] MEAN	S.D.	N	DIFF.	Level of[2] SIGNIF.
CMU	16.20	3.95	171	19.58	3.05	1557	-3.38	.01
CMR	18.10	3.40	172	21.55	2.45	1553	-3.45	.01
CMS	14.45	3.52	172	18.03	2.74	1547	-3.58	.01
MFU	15.12	3.56	171	14.01	4.08	1540	+1.11	.01
NST	122.50	33.00	172	139.66	24.93	1551	-17.16	.01

[1]Intermediate Grade Norms from the SOI Institute

[2]Determined by t-test for means

Advanced Reading Skills

The Structure of Intellect system indentifies five cells related to advanced reading skills. The cell name and illustrations of classroom tasks are:

1. CMU - Cognition of Semantic Units (comprehension of vocabulary, terms, and definitions)
2. CMR - Cognition of Semantic Relations (comprehension of verbal relationships such as analogies)
3. CMS - Cognition of Semantic Systems (comprehension of sequencing words into a sentence)
4. MFU - Memory of Figural Units (visual recall of details)
5. NST - Convergent Production of Symbolic Transformations (speed of word recognition)

The reader is again reminded to refer to the above information when interpreting the following tables. The advanced reading skill cells outlined in Table 7 for 7th grade males shows that four of the five skills are significantly below intermediate norms published by the SOI Institute. There is no significant difference between the groups for Memory of Figural Units. This finding is consistent with the data in Table 1 where the Memory cell, MSU, was the only cell not below SOI norms.

Likewise, Table 8, which lists 7th grade female scores on advanced reading skills compared to SOI Intermediate norms isolates the Memory cell, Memory of Figural Units as the only cell where the UISD sample is not below norm. In the MFU cell the 7th grade females were significantly above norm.

Table 9 allows the reader to contrast 7th grade male scores with 7th grade female scores in advanced reading skills. Memory of Figural Units is the only cell which shows the 7th grade females ahead of the males to a significant degree.

Tenth grade advanced reading skills are portrayed for both males and females in Table 10. There are no significant differences between the two groups.

TABLE 9

Comparison of Raw Score Means for Selected Subtests
of the
SOI-LA Basic Skills Test

Grade: 7.9 D.O.T.: May 1980

Advanced Reading Skills

CELL	UISD Males MEAN	S.D.	N	UISD Females MEAN	S.D.	N	DIFF.	Level of SIGNIF.[1]
CMU	15.83	4.54	151	16.20	3.95	171	+0.37(F)	nsd
CMR	18.25	3.93	151	18.10	3.40	172	+0.15(M)	nsd
CMS	13.88	4.20	151	14.45	3.52	172	+0.57(F)	nsd
MFU	14.25	4.20	150	15.12	3.56	171	+0.87(F)	.05
NST	116.46	32.20	151	122.50	33.00	172	+6.04(F)	nsd

[1]Determined by t-test for means

TABLE 10

Comparison of Raw Score Means for Selected Subtests
of the
SOI-LA Basic Skills Test

Grade: 10.9 D.O.T.: May 1980

Advanced Reading Skills

CELL	UISD Males MEAN	S.D.	N	UISD Females MEAN	S.D.	N	DIFF.	Level of SIGNIF.[1]
CMU	20.99	3.58	100	20.52	2.92	120	+0.47(M)	nsd
CMR	20.96	2.76	96	20.53	2.86	119	+0.43(M)	nsd
CMS	15.88	3.77	94	16.22	3.35	116	+0.34(M)	nsd
MFU	14.33	3.80	99	14.40	3.62	122	+0.07(F)	nsd
NST	149.20	26.00	103	150.80	26.20	123	+0.20(F)	nsd

[1]Determined by t-test for means

Tables 11 and 12 depict comparisons between 7th and 10th graders for males and females. Both tables yield consistent results showing 10th graders significantly ahead of 7th graders in all cells except Memory of Figural Units. There appears to be no significant difference between the two grades on MFU cells.

TABLE 11

Comparison of Raw Score Means for Selected Subtests
of the
SOI-LA Basic Skills Test

Grades: 7.9 & 10.9 D.O.T.: May 1980

Advanced Reading Skills

CELL	UISD 7th Grade Males MEAN	S.D.	N	UISD 10th Grade Males MEAN	S.D.	N	DIFF.	Level of SIGNIF.[1]
CMU	15.83	4.54	151	20.99	3.58	100	+5.16(10)	.01
CMR	18.25	3.93	151	20.96	2.76	96	+2.71(10)	.01
CMS	13.88	4.20	151	15.88	3.77	94	+2.00(10)	.01
MFU	14.25	4.20	150	14.33	3.80	99	+0.08(10)	nsd
NST	116.46	32.20	151	149.20	26.00	103	+32.74(10)	.01

[1]Determined by t-test for means

TABLE 12

Comparison of Raw Score Means for Selected Subtests
of the
SOI-LA Basic Skills Test

Grades: 7.9 & 10.9 D.O.T.: May 1980

Advanced Reading Skills

CELL	UISD 7th Grade Females MEAN	S.D.	N	UISD 10th Grade Females MEAN	S.D.	N	DIFF.	Level of SIGNIF.[1]
CMU	16.20	3.95	171	20.52	2.92	120	+4.32(10)	.01
CMR	18.10	3.40	172	20.53	2.86	119	+2.43(10)	.01
CMS	14.45	3.52	172	16.22	3.35	116	+1.77(10)	.01
MFU	15.12	3.56	171	14.40	3.62	122	+0.72(7)	nsd
NST	122.50	33.00	172	150.80	26.20	123	+28.30(10)	.01

[1]Determined by t-test for means

Arithmetic Computational Skills

The Structure of Intellect system identifies eleven cells related to arithmetic computational skills. The cell names and illustrations of classroom tasks are:

1. CFS - Cognition of Figural Systems (comprehension of constancy of patterns)
2. CFT - Cognition of Figural Transformation (comprehension of spatial conservation)
3. CSR - Cognition of Symbolic Relations (comprehension of abstract relationships)
4. CSS - Cognition of Symbolic Systems (comprehension of series and progressions)
5. MSU - Memory of Symbolic Units (auditory attending and recall)
6. MSS - Memory of Symbolic Systems (auditory concentration for sequencing)
7. MSI - Memory of Symbolic Implications (inferential memory)
8. ESC - Evaluation of Symbolic Classes (judgment in classification of numbers)
9. ESS - Evaluation of Symbolic Systems (solving numerical series)
10. NSS - Convergent Production of Symbolic Systems (solving mathematical equations)
11. NSI - Convergent Production of Symbolic Implications (deductive reasoning)

Table 13 reveals that with two exceptions, 7th grade males scored significantly below the SOI norms. Memory of Symbolic Units showed no significant difference between the two groups, while Memory of Symbolic Implications was significantly higher than the norm group. Rereading of the descriptions of the cells, above, can give the reader insight into the classroom applications of those particular cells.

TABLE 13

Comparison of Raw Score Means for Selected Subtests
of the
SOI-LA Basic Test

Grade: 7.9 D.O.T.: May 1980

Arithmetic Computational Skills

SOI CELL	UISD Males MEAN	S.D.	N	SOI Nomrs[1] MEAN	S.D.	N	Diff. +/-	Level of[2] SIGNIF.
CFS	15.83	8.12	149	21.34	6.31	1560	-5.51	.01
CFT	10.15	3.39	151	14.17	3.27	1560	-4.02	.01
CSR	3.60	1.66	147	4.69	1.74	1553	-1.09	.01
CSS	5.94	1.38	145	7.04	0.96	1534	-1.10	.01
MSU	15.77	2.67	119	15.59	1.34	1554	+0.18	nsd
MSS	10.25	5.21	97	14.25	3.18	1550	-4.00	.01
MSI	9.68	3.92	151	9.04	2.91	1555	+0.64	.02
ESC	15.24	4.11	151	20.20	4.21	1544	-4.96	.01
ESS	4.80	2.06	148	7.04	1.02	1546	-2.24	.01
NSS	3.65	2.07	130	5.87	1.98	1546	-2.22	.01
NSI	16.05	5.36	151	18.40	3.70	1535	-2.35	.01

[1]Intermediate Grade Norms from the SOI Institute

[2]Determined by t-test for means

NOTE: The Reading Skills described in Tables 1 through 12 in conjunction with the above computational skills are necessary for mastery of mathematical word problems.

All of the differences in scores in Table 14 showed significant differences as the 7th grade girls were compared to the SOI norm group. Nine of the eleven cells indicated that the UISD 7th grade girls were significantly below SOI norms, while two of the eleven, MSU and MSI (the same as the males) were significantly higher than the norm group.

Table 15 compares 7th grade males and females on arithmetic computational skills. Nine of the eleven cells show no significant differences between the sexes. However, Memory of Symbolic Units and Memory of Symbolic Implications are both significantly different in favor of the females.

TABLE 14

Comparison of Raw Score Means for Selected Subtests
of the
SOI-LA Basic Test

Grade: 7.9 D.O.T.: May 1980

Arithmetic Computational Skills

CELL	UISD Females MEAN	S.D.	N	SOI Norms[1] MEAN	S.D.	N	DIFF.	Level of[2] SIGNIF.
CFS	16.32	7.48	170	21.34	6.31	1560	-5.02	.01
CFT	9.68	3.29	172	14.17	3.27	1560	-4.49	.01
CSR	3.63	1.65	169	4.69	1.74	1553	-1.06	.01
CSS	6.02	1.14	170	7.04	0.96	1534	-1.02	.01
MSU	16.58	2.10	137	15.59	1.34	1554	+0.99	.01
MSS	10.70	5.44	119	14.25	3.18	1550	-3.55	.01
MSI	11.02	3.91	169	9.04	2.91	1555	+1.98	.01
ESC	16.20	4.68	172	20.20	4.21	1544	-4.00	.01
ESS	4.98	1.88	168	7.04	1.02	1546	-2.06	.01
NSS	3.75	2.01	144	5.87	1.98	1546	-2.12	.01
NSI	17.10	4.51	172	18.40	3.70	1535	-1.30	.01

[1] Intermediate Grade Norms from the SOI Institute

[2] Determined by t-test for means

NOTE: The Reading Skills described in Tables 1 through 12 in conjunction with the above computational skills are necessary for mastery of mathematical word problems.

TABLE 15

Comparison of Raw Score Means for Selected Subtests
of the
SOI-LA Basic Test

Grade: 7.9 D.O.T.: May 1980

Arithmetic Computational Skills

CELL	UISD Males MEAN	S.D.	N	UISD Females MEAN	S.D.	N	DIFF.	Level of SIGNIF.[1]
CFS	15.83	8.12	149	16.32	7.48	170	+0.49(F)	nsd
CFT	10.15	3.39	151	9.68	3.29	172	+0.47(M)	nsd
CSR	3.60	1.66	147	3.63	1.65	169	+0.03(F)	nsd
CSS	5.94	1.38	145	6.02	1.14	170	+0.08(F)	nsd
MSU	15.77	2.67	119	16.58	2.10	137	+0.81(F)	.01
MSS	10.25	5.21	97	10.70	5.44	119	+0.45(F)	nsd
MSI	9.68	3.92	151	11.02	3.91	169	+1.34(F)	.01
ESC	15.24	4.11	151	16.20	4.68	172	+0.96(F)	nsd
ESS	4.80	2.06	148	4.98	1.88	168	+0.18(F)	nsd
NSS	3.65	2.07	130	3.75	2.01	144	+0.10(F)	nsd
NSI	16.05	5.36	151	17.10	4.51	172	+1.05(F)	nsd

[1]Determined by t-test for means

NOTE: The Reading Skills described in Tables 1 through 12 in conjunction with the above computational skills are necessary for mastery of mathematical word problems.

While differences between males and females at the 7th grade level in arithmetic computational skills are not great (two cells out of eleven, both positive in the female columns, as recorded in Table 15) differences between the sexes at the 10th grade level show a marked increase. Table 16 reveals that six of the eleven cells show no significant difference between the sexes; however, five of the eleven do show significant differences. They are CFT, CSS, MSI, ESC, and NSS. What should be of more interest to the reader is that of the five cells where there are differences, the males excel in four of the five!

TABLE 16

Comparison of Raw Score Means for Selected Subtests
of the
SOI-LA Basic Test

Grade: 10.9 D.O.T.: May 1980

Arithmetic Computational Skills

CELL	UISD Males MEAN	S.D.	N	UISD Females MEAN	S.D.	N	DIFF.	Level of SIGNIF.[1]
CFS	20.86	6.70	100	20.98	5.66	120	+0.12(F)	nsd
CFT	11.91	4.24	100	9.48	2.56	120	+2.43(M)	.01
CSR	4.54	2.08	96	4.51	1.82	116	+0.03(M)	nsd
CSS	6.97	0.99	103	6.60	1.01	118	+0.37(M)	.01
MSU	16.13	2.02	71	16.60	1.99	95	+0.47(F)	nsd
MSS	11.58	5.17	69	10.46	4.62	100	+1.12(M)	nsd
MSI	10.41	3.28	97	11.45	3.64	118	+1.04(F)	.05
ESC	19.94	4.39	101	18.70	4.78	118	+1.24(M)	.05
ESS	6.42	1.41	101	6.07	1.89	122	+0.35(M)	nsd
NSS	5.98	1.97	99	5.14	2.11	115	+0.84(M)	.01
NSI	19.11	3.74	103	18.90	3.32	122	+0.21(M)	nsd

[1]Determined by t-test for means

NOTE: The Reading Skills described in Tables 1 through 12 in conjunction with the above computational skills are necessary for mastery of mathematical word problems.

The three memory cells of the eleven cited in the arithmetic computational skills, MSU, MSS, and MSI show no significant differences for males between the 7th graders and 10th graders in Table 17. All others show significant differences favoring the 10th graders.

TABLE 17

Comparison of Raw Score Means for Selected Subtests of the SOI-LA Basic Test

Grades: 7.9 & 10.9 D.O.T.: May 1980

Arithmetic Computational Skills

CELL	UISD 7th Grade Males MEAN	S.D.	N	UISD 10th Grade Males MEAN	S.D.	N	DIFF.	Level of SIGNIF.[1]
CFS	15.83	8.12	149	20.86	6.70	100	+5.03(10)	.01
CFT	10.15	3.39	151	11.91	4.24	100	+1.76(10)	.01
CSR	3.60	1.66	147	4.54	2.08	96	+0.94(10)	.01
CSS	5.94	1.38	145	6.97	0.99	103	+1.03(10)	.01
MSU	15.77	2.67	119	16.13	2.02	71	+0.36(10)	nsd
MSS	10.25	5.21	97	11.58	5.17	69	+1.33(10)	nsd
MSI	9.68	3.92	151	10.41	3.28	97	+0.73(10)	nsd
ESC	15.24	4.11	151	19.94	4.39	101	+4.70(10)	.01
ESS	4.80	2.06	148	6.42	1.41	101	+1.62(10)	.01
NSS	3.65	2.07	130	5.98	1.97	99	+2.33(10)	.01
NSI	16.05	5.36	151	19.11	3.74	103	+3.06(10)	.01

[1]Determined by t-test for means

NOTE: The Reading Skills described in Tables 1 through 12 in conjunction with the above computational skills are necessary for mastery of mathematical word problems.

Table 18 describes the differences between 7th and 10th grade females on the arithmetic computational skills. As with the males, outlined in Table 17, the females also show no significant differences between 7th and 10th grade on the three memory cells, MSU, MSS, and MSI. Unlike the males, the females show no significant difference between 7th and 10th grades on

CFT, Cognition of Figural Transformations.

TABLE 18

Comparison of Raw Score Means for Selected Subtests
of the
SOI-LA Basic Test

Grades: 7.9 & 10.9 D.O.T.: May 1980

Arithmetic Computational Skills

CELL	UISD 7th Grade Females MEAN	S.D.	N	UISD 10th Grade Females MEAN	S.D.	N	DIFF.	Level of SIGNIF.[1]
CFS	16.32	7.48	170	20.98	5.66	120	+4.66(10)	.01
CFT	9.68	3.29	172	9.48	2.56	120	+0.20(7)	nsd
CSR	3.63	1.65	169	4.51	1.82	116	+0.88(10)	.01
CSS	6.02	1.14	170	6.60	1.01	118	+0.58(10)	.01
MSU	16.58	2.10	137	16.60	1.99	95	+0.02(10)	nsd
MSS	10.70	5.44	119	10.46	4.62	100	+0.24(7)	nsd
MSI	11.02	3.91	169	11.45	3.64	118	+0.43(10)	nsd
ESC	16.20	4.68	172	18.70	4.78	118	+2.50(10)	.01
ESS	4.98	1.88	168	6.07	1.89	122	+1.09(10)	.01
NSS	3.75	2.01	144	5.14	2.11	115	+1.39(10)	.01
NSI	17.10	4.51	172	18.90	3.32	122	+1.80(10)	.01

[1]Determined by t-test for means

NOTE: The Reading SKills described in Tables 1 through 12 in conjunction with the above computational skills are necessary for mastery of mathematical word problems.

Creative Thought

The Structure of Intellect system identifies three cells related to creative thought. The cell names and illustrations of classroom tasks are:

1. DFU - Divergent Production of Figural Units (creative and original designs and figures)
2. DSR - Divergent Production of Symbolic Relations (creative mathematical problem solving)
3. DMU - Divergent Production of Semantic Units (creative and fluent with words)

Table 19 depicts the 7th grade males as significantly below the SOI norms on DSR and DMU, but no significant difference in the DFU cell.

TABLE 19

Comparison of Raw Score Means for Selected Subtests of the SOI-LA Basic Test

Grade: 7.9 D.O.T.: May 1980

Creative Thought

SOI CELL	UISD Males MEAN	S.D.	N	SOI Norms[1] MEAN	S.D.	N	Diff. +/-	Level of SIGNIF.[2]
DFU	28.02	11.90	151	26.79	7.32	1560	+1.23	nsd
DSR	62.95	25.00	151	72.69	20.17	1557	-9.75	.01
DMU	63.36	24.30	146	71.31	18.89	1544	-7.95	.01

[1] Intermediate Grade Norms from the SOI Institute.

[2] Determined by t-test for means

The 7th grade females show an opposite pattern to creative thought in Table 20 than the boys did in Table 19. There are no significant differences in the DSR and DMU cells for the girls, but they are significantly higher than the norm group in the DFU cell.

TABLE 20

Comparison of Raw Score Means for Selected Subtests
of the
SOI-LA Basic Test

Grade: 7.9 D.O.T.: May 1980

Creative Thought

CELL	UISD Females MEAN	S.D.	N	SOI Norms[1] MEAN	S.D.	N	DIFF.	Level of[2] SIGNIF.
DFU	29.03	10.24	170	26.79	7.32	1560	+2.24	.01
DSR	70.10	21.10	171	72.69	20.17	1557	-2.59	nsd
DMU	73.18	20.22	170	71.31	18.89	1544	+1.87	nsd

[1]Intermediate Grade Norms from the SOI Institute.

[2]Determined by t-test for means

Comparisons in creative thought in Table 21 between 7th grade males and females show no significant difference in the DFU cell, but significant differences favoring the females in both the DSR and DMU cells.

TABLE 21

Comparison of Raw Score Means for Selected Subtests
of the
SOI-LA Basic Test

Grade: 7.9 D.O.T.: May 1980

Creative Thought

CELL	UISD Males MEAN	S.D.	N	UISD Females MEAN	S.D.	N	DIFF.	Level of[1] SIGNIF.
DFU	28.02	11.90	151	29.03	10.24	170	+1.01(F)	nsd
DSR	62.95	25.00	151	70.10	21.10	171	+7.15(F)	.01
DMU	63.36	24.30	146	73.18	20.22	170	+9.82(F)	.01

[1]Determined by t-test for means

Table 22 affords the reader an opportunity to compare creative thought between 10th grade males and females. There are no significant differences for the DFU and the DSR cells but a significant difference in the DMU cell favoring the females.

TABLE 22

Comparison of Raw Score Means for Selected Subtests
of the
SOI-LA Basic Test

Grade: 10.9 D.O.T.: May 1980

Creative Thought

CELL	UISD Males MEAN	S.D.	N	UISD Females MEAN	S.D.	N	DIFF.	Level of SIGNIF.[1]
DFU	30.48	13.90	102	28.43	7.00	120	+2.05(M)	nsd
DSR	72.73	19.73	96	72.42	19.45	119	+0.31(M)	nsd
DMU	77.35	23.75	100	86.79	18.45	120	+9.44(F)	.01

[1]Determined by t-test for means

Table 23 illustrates the differences between 7th and 10th grade males for creative thought. There are no significant differences in the DFU cell, but significant differences appear in the DSR, and DMU cells favoring the 10th grade males.

TABLE 23

Comparison of Raw Score Means for Selected Subtests
of the
SOI-LA Basic Test

Grades: 7.9 & 10.9 D.O.T.: May 1980

Creative Thought

CELL	UISD 7th Grade Males MEAN	S.D.	N	UISD 10th Grade Males MEAN	S.D.	N	DIFF.	Level of SIGNIF.[1]
DFU	28.02	11.90	151	30.48	13.90	102	+2.46(10)	nsd
DSR	62.95	25.00	151	72.73	19.73	96	+9.78(10)	.01
DMU	63.36	24.30	146	77.35	23.75	100	+13.99(10)	.01

[1]Determined by t-test for means

Table 24 shows differences between 7th grade females and 10th grade females in creative thought. No significant differences are evident in the DFU and DSR cells, but a significant difference appears in the DMU cell favoring 10th grade females.

TABLE 24

Comparison of Raw Score Means for Selected Subtests
of the
SOI-LA Basic Test

Grades: 7.9 & 10.9 D.O.T.: May 1980

Creative Thought

CELL	UISD 7th Grade Females MEAN	S.D.	N	UISD 10th Grade Females MEAN	S.D.	N	DIFF.	Level of SIGNIF.[1]
DFU	29.03	10.24	170	28.43	7.00	120	+0.60(7)	nsd
DSR	70.10	21.10	171	72.42	19.45	110	+2.32(10)	nsd
DMU	73.18	20.22	170	86.79	18.45	120	+13.61(10)	.01

[1]Determined by t-test for means

Class Rosters

Tables 25 through 28 are computer print-outs from the SOI Institute of samples of class rosters which depict cells requiring remediation for individuals of a class according to SOI norms. For example, student #15 in Table 25 requires remediation in just two of the eleven reading cells, EFC and MFU. However, student #19, in the same class shown on Table 25, is in need of help in ten of the eleven reading cells. Read in that manner, it is quite simple to identify individual students requiring aid in specific skills. The tables can also provide information to a teacher about the entire class. Again, using Table 25 as an illustration, it is evident that nineteen of the twenty students in that particular class are doing fine in MSU, while eighteen of the twenty students have problems with EFC skills. Large group instruction, in EFC skills, would certainly constitute a sound academic decision by the teacher of that class.

Tables 26, 27, and 28 may be read in a similar manner as described above. It is interesting to compare the 7th grade class to the 10th grade class in both reading and arithmetic areas. Cells which were weak in the 7th grade were also weak in the 10th grade and cells which were at norm in the 7th grade tended to be at norm in the 10th grade.

TABLE 25

EXERCISES COMPILED BY CLASS ROSTER FOR SOILA TESTING

Date: 1/05/81

Grade: 7th - Males & Females

READING ABILITIES

CFU	CFC	Visual MSU	MSS	EFU	EFC	CMU	CMR	CMS	MFU	NST	Id-#
	S		S		S	S		S			1
	S		S	S	S		S			S	2
S	S	S	S		S	S	S	S	S		3
S	S			S	S		S	S	S		4
				S	S	S	S			S	5
	S		S	S	S	S	S	S	S	S	6
	S		S	S	S			S			7
S	S		S	S	S	S	S	S	S	S	8
S	S			S	S	S	S	S		S	9
S	S		S	S		S	S	S		S	10
	S		S		S	S	S	S			11
	S			S	S	S	S	S	S		12
S			S	S	S	S	S	S	S	S	13
S	S		S	S	S	S	S	S	S		14
					S				S		15
S			S	S	S	S	S	S	S	S	16
			S	S	S	S		S	S		17
	S		S	S	S	S	S	S		S	18
S	S		S	S	S	S	S	S	S	S	19
	S		S	S		S	S	S	S	S	20

S = Specific skill remediation.

TABLE 26

EXERCISES COMPILED BY CLASS ROSTER FOR SOILA TESTING

Date: 02/06/81

Grade: 10th - Males & Females

READING ABILITIES

CFU	CFC	Visual MSU	MSS	EFU	EFC	CMU	CMR	CMS	MFU	NST	Id-#
...	...	...	S	S	...	...	...	...	...	S	1
S	S	...	...	S	S	...	S	S	...	S	2
...	S	...	S	...	S	...	...	S	...	...	3
...	S	...	...	...	S	...	S	...	S	...	4
S	...	...	S	...	S	...	...	S	S	...	5
S	...	...	...	S	S	S	S	S	S	S	6
...	S	...	...	S	S	...	S	S	...	...	7
S	S	...	S	S	...	...	...	...	...	...	8
...	S	...	...	...	S	S	S	S	S	S	9
S	...	...	...	S	S	...	...	S	...	...	10
...	S	...	S	S	S	S	S	...	S	...	11
...	...	...	S	S	S	...	S	S	S	...	12
...	...	...	S	S	S	...	...	...	...	...	13
S	...	...	...	...	...	...	S	...	S	...	14
S	...	...	...	...	S	...	...	...	...	...	15
S	...	...	...	S	S	...	S	S	...	...	16
...	...	...	...	S	...	...	...	...	...	...	17
...	S	...	...	S	S	...	...	...	S	...	18
S	...	...	S	S	S	S	...	S	S	S	19
S	S	...	...	S	...	S	S	S	S	S	20
...	S	...	S	...	S	...	...	...	...	...	21
S	S	...	S	S	...	S	S	...	...	...	22
...	S	...	...	...	...	...	...	S	S	...	23
...	S	...	...	S	S	...	S	S	S	...	24
S	...	...	S	...	S	...	S	S	...	...	25
...	S	...	S	...	S	...	...	...	...	...	26
...	S	...	S	...	S	S	S	S	...	...	27
...	S	S	S	S	S	S	S	S	...	S	28
...	...	...	S	...	S	S	S	...	S	S	29
...	...	...	S	...	S	S	S	S	...	S	30
S	S	S	...	S	...	...	...	...	...	...	31
...	...	...	...	...	...	...	...	...	...	...	32
...	...	...	...	S	S	...	...	...	...	...	33
...	S	...	S	...	S	...	...	...	...	...	34
...	S	...	...	S	...	...	...	...	...	...	35
...	...	...	S	...	S	S	S	S	S	...	36
...	S	...	S	S	S	S	S	S	S	...	37
S	...	...	...	S	...	S	S	S	...	...	38
S	...	...	...	S	...	S	S	S	...	...	39
...	S	...	...	S	S	S	S	S	S	S	40

S = Specific skill remediation

TABLE 27

EXERCISES COMPILED BY CLASS ROSTER FOR SOILA TESTING

Date : 1/05/81

Grade: 7th - Males & Females

ARITHMETIC ABILITIES

Auditory

CMU	CMR	CMS	MFU	NST	CFS	CFT	CSR	CSS	MSU	MSS	MSI	ESC	ESS	NSS	NSI	NFU	Id-#
S		S				S		S				S	S			S	1
	S			S		S		S		S			S	S			2
S	S	S	S				S			S	S	S		S	S		3
	S	S	S		S	S	S	S		S	S	S	S		S		4
S	S			S	S	S	S	S		S			S	S			5
S	S	S	S	S								S	S	S	S		6
		S			S	S	S						S				7
S	S	S	S	S	S	S	S	S				S	S	S	S	S	8
S	S	S		S	S	S	S					S	S	S	S		9
S	S	S		S	S	S	S	S	S	S		S	S	S	S	S	10
S	S	S			S	S		S				S	S	S	S		11
S	S	S	S			S		S				S	S	S	S		12
S	S	S	S	S		S				S	S	S	S	S			13
S	S	S	S		S	S	S	S	S	S		S	S	S	S		14
			S			S			S	S	S	S					15
S	S	S	S	S	S	S	S	S				S	S	S	S		16
S		S	S		S	S		S					S		S		17
S	S	S		S		S	S	S				S	S	S	S		18
S	S	S	S	S	S	S	S	S				S	S	S	S		19
S	S	S	S	S		S		S				S	S	S			20

S = Specific skill remediation.

TABLE 28

EXERCISES COMPILED BY CLASS ROSTER FOR SOILA TESTING

Date: 02/06/81

Grade: 10th - Males & Females

ARITHMETIC ABILITIES

CMU	CMR	CMS	MFU	NST	CFS	CFT	CSR	CSS	Auditory MSU	MSS	MSI	ESC	ESS	NSS	NSI	NFU	Id-#
...	...	...	...	S	...	S	...	S	...	...	...	S	...	...	...	S	1
...	S	S	...	S	S	S	S	S	...	S	...	S	S	S	S	...	2
...	...	S	...	...	...	...	...	...	...	...	...	S	S	S	...	...	3
...	S	...	S	...	...	S	...	S	...	...	...	S	S	S	...	...	4
...	...	S	S	...	...	...	...	...	S	S	...	...	...	...	...	...	5
S	S	S	S	S	...	S	...	S	...	...	S	...	S	S	...	...	6
...	S	S	...	...	S	S	...	S	...	S	...	S	S	S	S	...	7
...	...	...	...	...	...	S	S	...	...	S	...	...	...	...	...	...	8
S	S	S	S	S	...	S	S	S	...	S	...	S	S	S	S	...	9
...	...	S	...	...	...	S	...	...	...	S	...	S	...	...	S	S	10
S	S	...	S	...	...	S	S	S	...	S	S	S	S	S	...	...	11
...	S	S	S	...	...	S	S	...	...	S	...	...	S	S	...	...	12
...	...	...	...	...	S	S	...	...	...	S	...	...	...	...	...	...	13
...	S	...	S	...	S	S	...	...	...	...	...	S	...	S	S	...	14
...	...	...	...	...	...	S	...	...	...	S	S	...	...	...	...	...	15
...	S	S	...	...	S	S	...	...	...	...	...	S	S	S	...	S	16
...	...	...	...	...	...	...	...	...	...	S	S	...	...	...	...	S	17
...	...	...	S	...	...	S	...	...	...	S	...	...	...	S	...	S	18
S	...	S	S	S	S	S	...	S	...	S	...	S	S	S	...	...	19
S	S	S	S	S	S	S	S	S	...	S	S	S	S	S	S	...	20
...	...	...	...	...	...	S	S	...	...	S	S	...	...	...	...	S	21
S	S	...	...	...	S	S	S	...	...	S	...	...	S	S	...	...	22
...	...	S	S	...	S	...	...	...	...	S	...	S	...	...	...	S	23
...	S	S	S	...	S	S	S	S	S	S	S	S	S	S	S	...	24
...	S	S	...	...	...	S	...	...	...	S	...	S	...	S	S	S	25
...	...	...	...	...	...	S	S	S	...	S	...	...	S	S	...	...	26
S	S	S	...	...	...	S	...	...	...	...	...	S	...	...	...	S	27
S	S	S	...	S	...	S	...	...	...	S	S	...	...	S	S	...	28
S	S	...	S	S	...	S	S	...	...	S	...	S	...	...	S	...	29
S	S	S	...	S	S	...	...	...	...	S	...	...	S	S	...	...	30
...	...	...	...	...	...	S	...	...	...	S	...	...	...	...	...	...	31
...	...	...	...	...	...	S	...	...	...	...	...	S	...	S	...	...	32
...	...	...	...	...	...	S	...	...	...	...	...	...	...	...	...	...	33
...	...	...	...	...	...	...	S	...	...	S	...	...	...	...	...	S	34
...	...	...	...	...	...	S	...	...	...	...	...	...	...	...	...	...	35
S	S	S	S	...	...	S	S	...	...	...	...	S	...	...	...	...	36
S	S	S	S	...	...	S	S	...	...	...	...	S	S	...	S	S	37
S	S	S	...	...	...	S	S	S	...	...	S	...	S	S	S	...	38
S	S	S	...	...	...	S	S	S	...	...	S	...	S	S	S	...	39
S	S	S	S	S	S	S	S	S	...	...	...	S	...	...	...	...	40

S = Specific skill remediation.

The Relevance of SOI

The Structure of Intellect presents a unique and totally different vehicle for assessing the curricula of a school district. Therefore, it is valid to inquire about the relationship between SOI and other aspects of the curricula. United Independent School District used the Comprehensive Tests of Basic Skills (CTBS) as the standardized test to measure school district achievement; therefore, a computation was made of the correlation coefficient of the SOI and the CTBS in reading and mathematics to ascertain the extent of the relationship between the two measures. Table 29 indicates that there were positive relationships in every case examined ranging from moderate to good, between SOI scores on reading and mathematics compared to CTBS scores in reading and mathematics.

TABLE 29

Relationship Between Standardized Test Achievement Scores and Performance on A Combination of SOI Cells - 1980

GRADE	SEX	CTBS[1]	SOI	r^2
7	M	Reading	Reading	.62
7	F	Reading	Reading	.57
7	M	Math	Math	.55
7	F	Math	Math	.60
7	M	Composite	Composite	.68
7	F	Composite	Composite	.57
10	M	Reading	Reading	.58
10	F	Reading	Reading	.60
10	M	Math	Math	.62
10	F	Math	Math	.67
10	M	Composite	Composite	.73
10	F	Composite	Composite	.70

[1]Comprehensive Tests of Basic Skills

[2]Correlation Coefficient by Linear Regression

Curricular Implications of the Study

Summary

Teachers and administrators involved in the planning and implementation of a program for the gifted (Apollo) at United Independent School District selected the "Structure of Intellect (SOI) as a model for curriculum development. Expanded interest in the SOI model, including the SOI Learning Abilities Test, was expressed by the Apollo group as well as other teachers in the District. The school district and Laredo State University entered into a joint research project to analyze the results of the SOI Learning Abilities Test administered to the District seventh and tenth graders.

The Purpose of the Curriculum

The subjects or courses which are taught at any grade level serve as a vehicle for students to acquire important information and develop thinking skills. The proximate purpose of the curriculum is to educate students to transfer the information acquired and the thinking skills developed to the home, the job, the next school--to life in general.

The classic question in learning theory of "transfer" (application or facilitation of previous learning to different situations) was clarified by Piaget (4) in his definitions of adaptation, assimilation, and accommodation. Piaget and his associates also produced a large variety of Piagetian tasks to assess a student in his ability to "transfer" intellectually. It remained for Meeker's interpretation and adaptation of the Guilford SOI model to offer schools an analytical tool to microscopically examine the effect of the curriculum on its students.

Curricular Implications

The analysis of the data in this study has implications for transformation of the curricula in 7th and 10th grades so that

students may improve specific skills to achieve at higher reading and arithmetic levels. The following statements reflect the observations and recommendations of the author of this paper.

1. Seventh grade males and females scored significantly below most SOI norms in basic reading skills. They need to work with classification, visual closure, and visual discrimination tasks. They did very well in simple recall of items. (Tables 1 and 2)
2. Seventh grade males and females scored similarly in basic reading skills. There is no need to differentiate the curriculum in that area. (Table 3)
3. Tenth grade males and females scored similarly in basic reading skills. (Table 4)
4. Several cells in basic reading skills showed no difference between 7th grade and 10th grade scores for both males and females. Tasks in the 10th grade, in the appropriate cells should be introduced into a differentiated curriculum, since the cells for males and females were different. (Tables 5 and 6)
5. Seventh grade males and females scored significantly below most SOI norms in advanced reading skills. They need to work in vocabulary, verbal analogy, and sequencing tasks. Again, they seemed to do their best in simple recall of items. Is the curriculum overloaded with recall? (Tables 7 and 8)
6. Seventh grade males and females scored similarly in advanced reading skills. There is no need to differentiate the curriculum in that area. (Table 9)
7. Tenth grade males and females scored similarly in advanced reading skills. (Table 9)
8. Virtually all cells in advanced reading skills show a difference favoring tenth grade males and females over their seventh grade counterparts. (Tables 11 and 12)

9. Seventh grade males and females scored significantly below most SOI norms in arithmetic computational skills. The two of eleven cells which were not below norm were in the area of memory. Is the curriculum overloaded with recall? They need to work with classification, relational, systemic, transformational, and inferential tasks. (Tables 13 and 14)
10. Seventh grade males and females scored similarly in most cells in arithmetic computational skills. There is no need to differentiate the curriculum in that area. (Table 15)
11. Tenth grade males and females showed significant differences in five of the eleven cells in arithmetic computational skills. Differentiated tasks for males and females in those areas would seem justified. (Table 16)
12. Most of the cells in arithmetic computational skills show a difference favoring tenth grade males and females over the seventh graders. (Tables 17 and 18)
13. There appears to be a wide range of variance between groups and within groups in the cells dealing with creative thought. There is obviously a need for a differentiated curriculum in that area for both 7th and 10th graders. (Tables 19 through 24)
14. The analysis of class rosters indicates that specific cells can be identified where many or most students need remediation; however, there was enough variance among the students to justify differentiation in the curriculum based upon identified strengths or weaknesses. (Tables 25 through 28)
15. Moderate to good positive correlations were found between SOI scores and standardized test scores. Additional analyses between SOI cells and various factors in the curriculum is recommended so that students can increase their achievement levels as well as their standardized test scores. (Table 29)

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Appendices

Baseline Data - United Independent School District

Appendix I: SOI-LA Quartile Raw Scores for 7th Grade Males & Females

Appendix II: SOI-LA Quartile Raw Scores for 10th Grade Males & Females

APPENDIX I

SOI-LA Quartile Raw Scores

Grade: 7.9 D.O.T.: May 1980

	UISD Males			UISD Females		
CELL	Q_1	Q_2	Q_3	Q_1	Q_2	Q_3
Basic Reading Skills						
CFU	9.55	11.54	13.21	8.92	10.81	12.42
CFC	4.69	5.82	7.25	5.00	6.20	7.40
EFU	13.21	15.70	17.64	14.40	16.20	18.60
EFC	7.62	8.79	10.08	7.20	8.40	9.90
MSU	16.79	17.69	18.09	16.84	17.66	18.08
MSS	7.02	12.15	17.72	7.35	12.88	17.83
Arithmetic Computational Skills						
CFS	8.50	18.64	23.31	8.83	18.05	23.27
CFT	7.29	9.61	12.25	7.18	9.56	11.50
CSR	2.43	3.35	4.56	2.39	3.50	4.76
CSS	5.53	6.11	6.81	5.36	6.10	6.68
MSU	14.28	16.78	17.85	16.05	17.26	17.93
MSS	6.61	10.50	14.30	6.62	11.81	15.30
MSI	6.90	9.29	12.50	7.93	10.57	13.59
ESC	12.42	15.26	18.10	12.24	15.64	19.50
ESS	3.10	4.98	6.34	3.63	5.08	6.40
NSS	1.97	3.50	4.72	2.00	3.50	5.30
NSI	11.50	18.50	20.66	14.45	18.80	20.75
Advanced Reading Skills						
CMU	12.92	15.37	18.94	13.77	16.45	18.88
CMR	16.17	18.63	20.86	15.85	18.28	20.76
CMS	10.83	14.29	17.00	11.50	14.92	17.46
MFU	11.42	14.50	17.17	13.07	15.50	17.44
NST	100.62	111.39	131.38	101.40	121.40	141.20
Creative Thought						
DFU	18.55	24.29	34.00	18.10	27.80	33.40
DSR	40.72	61.18	71.47	56.50	71.86	82.05
DMU	41.03	60.93	80.68	58.92	70.98	88.57

APPENDIX II

SOI-LA Quartile Raw Scores

Grade: 10.9 D.O.T.: May 1980

	UISD Males			UISD Females		
CELL	Q_1	Q_2	Q_3	Q_1	Q_2	Q_3
Basic Reading Skills						
CFU	10.80	12.50	13.50	10.30	11.70	13.50
CFC	5.64	6.76	7.82	5.75	6.70	7.70
EFU	15.90	18.10	20.00	15.10	17.00	18.90
EFC	7.75	8.97	10.22	8.10	9.40	10.60
MSU	17.00	17.80	18.10	16.80	17.80	18.15
MSS	9.25	13.13	17.86	7.50	14.00	17.90
Arithmetic Computational Skills						
CFS	18.28	24.21	25.46	18.90	22.70	24.60
CFT	8.70	11.40	14.40	7.60	9.00	11.10
CSR	3.08	4.66	6.12	3.20	4.60	5.80
CSS	6.24	7.09	7.88	6.00	6.70	7.35
MSU	15.14	16.57	17.77	15.95	17.10	17.90
MSS	7.14	12.20	17.65	6.80	11.80	13.20
MSI	8.50	10.30	12.10	8.00	11.50	14.20
ESC	16.75	20.07	23.63	16.60	18.40	22.20
ESS	5.19	6.92	7.81	4.80	6.40	7.75
NSS	4.33	6.65	7.72	3.60	4.90	7.30
NSI	18.30	20.24	20.86	18.10	20.50	21.00
Advanced Reading Skills						
CMU	18.40	20.10	23.50	18.80	20.80	22.20
CMR	19.10	21.30	23.20	19.00	21.20	22.60
CMS	13.00	15.90	18.80	13.50	16.80	19.30
MFU	11.13	14.40	16.80	12.40	14.60	16.80
NST	129.90	149.50	164.90	130.60	146.00	171.00
Creative Thought						
DFU	22.00	30.00	38.50	19.10	27.50	36.70
DSR	59.85	74.90	86.20	60.20	75.00	80.20
DMU	61.00	79.00	96.50	71.13	85.97	100.72